DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

CEMP-EC

2 2 APR 1999

MEMORANDUM FOR COMMANDERS, MAJOR SUBORDINATE COMMANDS

SUBJECT: Resident Management System (RMS) Deployment Plan

1. References:

    a. Memorandum, CEMP-EC, 7 Aug 99, Subject: Resident Management System (RMS) Draft Deployment Plan
    b. Memorandum, CEIM-L, 10 Nov 98, System Decision Memorandum on the Resident Management System

2. This memorandum provides the RMS for Windows (RMS-W) deployment plan for your information, planning and action.

3. The RMS is designated as the USACE standard construction management information system. It focuses on the construction phase of project management and will provide comprehensive support for construction managers. It will interface with other key USACE systems such as PROMIS and CEFMS, and later with the Standard Procurement System (SPS), which will replace SAACONS. It applies to all construction contract work managed by field construction offices (area, resident, project offices) regardless of type of program, funds, or contract. It will also send construction status information to PROMIS for review and decision-making by project managers and commanders at all levels of USACE. Current RMS business rules and guidelines are provided at Enclosure 1.

4. Development and testing of the initial RMS-W version was completed, and limited deployment to SWD and SPD began in December 1998. Based on this, it was determined that some additional features should be added to RMS-W. These are currently being finished and tested.

5. We expect deployment to resume in May 1999. Like other major system deployments, our strategy is to deploy RMS-W in a series of phases, with each deployment phase consisting of two MSCs. Deployment of RMS-W will require coordinated support and management by MSCs and districts. Enclosure 2 provides the current phased deployment schedule for RMS. Prior to the start of each phase, commanders will identify an RMS deployment coordinator for each MSC and a district team that includes the following key members:

    a. District RMS deployment manager
    b. District RMS database administrator
    c. District RMS system administrator
    d. District RMS principal trainers

6. The above duties are intended to be assigned to existing staff, preferably to persons providing similar functions for other systems previously deployed to and operating in the district. Guidance on specific duties and responsibilities of each RMS deployment team member is in Enclosure 3.

7. Training for RMS deployment will use a "train-the-trainer" approach. This training will supplement information provided in an *RMS Users Manual*, through *on-line helps* within RMS, and via a *RMS website*. Information on the RMS training strategy is provided at Enclosure 4.
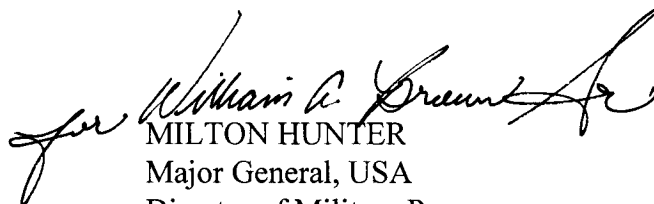
8. The RMS-W is a client-server system. The Oracle software for the RMS database management will be obtained through HQUSACE (Enclosure 5), and RMS application software will be accessible from a RMS Website, or may be shipped via a CD. The USACE RMS Center located in Apple Valley, CA will coordinate deployment of RMS-W throughout USACE. The HQUSACE staff, who will coordinate closely with USACE commanders, their staffs and the RMS Center staff, will provide monitoring and assistance. Enclosure 7 provides details on the system architecture and hardware supporting RMS.

9. Development and RMS Center support costs are recovered via an annual site license fee. Application of this site license charge took effect at the start of FY 99, based on approval to deploy RMS (ref.b.). Guidance on RMS site license fees was provided to commands by HQUSACE Resources Management Directorate in November 1998. Enclosure 6 summarizes this information.

10. We realize that implementation of any new system will impact your operations to varying degrees. We look forward to working with you and your staff to implement RMS-W in an orderly and effective manner. We ask that you give this deployment plan the appropriate level of attention to make RMS deployment in USACE successful. Additional guidance and information will be provided as we proceed on this important initiative to link team members and enhance their effectiveness. This memorandum has been coordinated with CEIM, CERM and CECW. My point of contact in Military Programs is Jim Lovo, CEMP-EC, (202) 761-4804.

FOR THE COMMANDER:

Encl

MILTON HUNTER
Major General, USA
Director of Military Programs

CF:
MSC DIMs and DETs
DISTRICT COMMANDERS
DISTRICT CONSTRUCTION CHIEFS and CHIEFS OF INFORMATION
    MANAGEMENT

CEMP-EC
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RMS Business Rules and Guidelines

General Guidelines

1. Use of RMS will follow an "above-the-line" and "below-the-line" concept of operations. *Above the line* RMS data/use will be *mandatory* for all users. Above the line data/use will be kept to the minimum needed, in order to provide users & commanders flexibility. *Below the line* RMS data/use will be at MSC, district, or field office *option*, as directed by commanders below HQUSACE.

2. Where applicable, RMS DOS use will continue until RMS-W fully functions at a site. Transfer of data from RMS DOS to RMS Windows will be done using available RMS data transfer software developed for this purpose. This transfer of RMS DOS records will be done on a selected basis, as required. The RMS Center will also assist and advise MSCs who convert from a major legacy system, such as INCOME in SAD.

   Generally, completed contracts, ongoing contracts which are 50% or more completed, or ongoing short duration contracts will <u>not</u> be required to be transferred to RMS-W. Population of the RMS-W database should be closely coordinated with project and financial managers, and contracting staff to ensure synchronized efforts with PROMIS, CEFMS, SAACONS and SPS activities. Commanders at MSCs and districts may choose to transfer ongoing contracts which are more than 50% complete, when necessary for local management needs.

3. The RMS will interface with PROMIS, CEFMS and later with SPS to share construction contract information with these systems and managers using these systems. One-time data entry and the use of RMS interfaces mean that PROMIS and SPS will not need to be deployed at field construction offices. This will minimize costs and complexity for construction field offices while supporting efficient, effective district operations led by program management. Because CEFMS supports other activities such as timekeeping, travel, training and financial commitment/obligation actions, CEFMS will continue to be in place at construction field offices.

Above the Line Operations

1. RMS will be used for *managing construction work under all programs*, including Civil Works Construction, Military Programs, Environmental Programs, and Interagency/Intergovernmental Support. Note for CW Operations & Maintenance Program: RMS use is required for all construction contracts performed in this program, but is optional for other types of contracts/work.

2. *All construction contract work** will be loaded into RMS. This is necessary to capture and electronically report construction execution status to the district and to PROMIS via the RMS-PROMIS interface. Later, this will also allow input of contract changes data (modifications) to SPS. PROMIS will link with managers and systems at various headquarters above the district.

ENCLOSURE 1

Above the Line Operations (continued)

* Basic construction contract execution data will consist of elements that conform to the information needed by the HQ PM module (which approximates the former AMPRS data elements in the Construction Managers Report). This includes data needed to calculate the current working estimate (CWE) for military programs work, and similar summary data for other work. See General Guidelines item 2 above for guidance relating to ongoing contracts.

3. Basic *quality assurance* comments required for *quality assurance* reports. These basic QA comments provide a record of on-site contractor-government activities, a link to evaluation of progress payment requests, and a basis for evaluating claims and resolving contract disputes.

4. All construction contract *progress and final payments* will be done by construction field offices using the *RMS-CEFMS progress payment interface*. This will support achieving efficiency, prompt payment, and paperless contracting objectives.

5. All construction *change requests* and *contract modifications* performed by construction field offices will be captured in RMS. We are currently pursuing an interface with SPS, which will allow mods captured in RMS to be electronically uploaded to SPS. (Note: this RMS-SPS interface for construction modifications will not be operational in the initial version of RMS-W. The target is to have it developed, tested and available for use later this calendar year.)

6. USACE design contracts, construction contracts, and combination (e.g., design-build) contracts will include technical specifications to require certain outputs (e.g., submittal registers, draft DD 1354 transfer documents, quality control reports, payment requests, contractor construction schedules, etc.) in RMS-compatible electronic formats. Appropriate technical guide specifications for A-E and construction contracts will be provided in deployment instructions.

ENCLOSURE 1

Below the Line Operations

1. Loading the basic construction contract into RMS, recording execution status and issues, performing progress payments, and performing field office construction modifications will be *above the line* RMS operations. RMS Windows has many other capabilities that may be used to improve operations. These other features, data and uses of RMS will generally be *below the line* operations. Construction contracts can range from $200 million, multi-year, multi-funded, multi-phase types of projects to $20,000 Job Order Contract task orders accomplished in a week. Hence, it is not practical to direct a *single approach* on RMS use for items such as submittal registers, quality control reports, all quality assurance reporting, lessons learned, correspondence, digital images, contractor scheduling and schedule evaluation, customer reporting, etc. However, it is anticipated that many of these RMS features will be used on many projects to improve the quality and overall effectiveness of our project delivery system.

2. USACE customers will not tie directly into RMS. Of course, customers may be provided printed or electronic copies of standard or customized RMS reports. It is also planned that selected RMS reports, along with selected PROMIS and CEFMS reports will be available to customers via a composite USACE reports website. The type, amount, and method of RMS information provided to customers will be decided by MSCs and districts.

ENCLOSURE 1

CEMP-EC
SUBJECT: Resident Management System (RMS) Deployment Plan

<u>Schedule for RMS-Windows Deployment</u> (as of 21 Apr 99)

The following phased schedule shows planned dates for *achieving Initial Operating Capability* (IOC) and *Full Operating Capability* (FOC) of RMS-W. These are defined as:

IOC: Occurs in an MSC when:
    a. Each district headquarters construction office and at least two of each district's field offices (area or resident) have successfully installed RMS.
    b. The deployed sites have established effective communication links to the district headquarters and/or to the CEAP Processing Center.
    c. Deployed sites use RMS to manage at least one construction contract at each field office.
FOC: Occurs in an MSC when:
    a. Each district headquarters construction office and all field offices (area, resident and project) have installed RMS.
    b. All deployed sites have established effective communication links to district headquarters and/or to the CEAP Processing Center.
    c. Deployed sites use RMS to manage at least one construction contract at each field office.

MSC	Start	IOC	FOC
	Phase 1		
SPD	Dec 98	May 99	Aug 99
SWD	Dec 98	May 99	Aug 99
	Phase 2		
LRD	May 99	Jul 99	Nov 99
SAD (part a)	Jun 99	Jul 99	Dec 99
(Jacksonville, Mobile, Savannah)			
	Phase 3		
SAD (part b)	Jul 99	Sep 99	Nov 99
(Charleston, Wilmington)			
HND	Jul 99	Oct 99	Nov 99
NAD	Aug 99	Oct 99	Jan 00
	Phase 4		
NWD	Sep 99	Dec 99	Mar 00
MVD	Oct 99	Dec 99	Mar 00
	Phase 5		
POD	Nov 99	Jan 00	Mar 00
TAC	Dec 99	Jan 00	Mar 00

ENCLOSURE 2

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Guidance Concerning RMS Deployment Team Members

1. **General**: Deploying RMS Windows within a MSC or district is a big job. Planning and teamwork are keys to success. RMS is being deployed in a phased manner both within USACE as a whole and within each MSC. A phased approach is planned to avoid overloading limited management and support resources, to control risks, and to incorporate lessons learned. Since construction managers are located away from the district headquarters office, a significant part of the deployment effort will take place out at the construction area office, resident office and often at the project office.

2. **Identification of MSC Coordinator for RMS Deployment**: HQUSACE and the RMS Center will coordinate deployment planning and execution activities through each MSC. Accordingly, each MSC will identify an individual or team to serve as the MSC-wide coordinator.

3. **Identification of the District's RMS Deployment Team**: Successful deployment and operation of RMS require a *team effort*. RMS Windows interfaces with the Corps financial management information system (*CEFMS*), the project management information system (*PROMIS*), and will interface with the incoming DOD contracting information management system (*SPS/PD2-Standard Procurement System/Procurement Desktop Two*). The RMS team therefore needs to work closely with district resource management, project management and contracting staff, as well as construction and information managers at the district. Finally, because a standard system such as RMS impacts *almost all* operations at a district, the senior leadership (e.g., district commander and DDPM) also must be aware, knowledgeable and involved in RMS deployment planning and execution.

These are the key members of the **district RMS deployment team**:

a. **District RMS Deployment Manager**: the RMS deployment manager is an individual designated by the district leadership as the person responsible for *overall leadership and management* of all activities relating to RMS deployment within the district, including construction field office sites. The RMS deployment manager will coordinate with various information management, construction, program management, financial management, contracting and other personnel within the district, at the parent MSC and at the USACE RMS Center, to effectively plan and implement a successful RMS deployment within the district. After implementation of RMS within the district, this person serves as the district's RMS *operations and support coordinator*. This person should have good leadership and teamwork skills, a working knowledge of information systems/technology, and the trust and confidence of the command and construction leaders within the district.

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These are the main *duties and responsibilities* of the **District RMS Deployment Manager**:

- Ensure that other members of RMS Deployment Team are designated & fulfill their roles.

- Provide effective planning, leadership and follow through for all RMS deployment activities.

- Ensure continuity of operations in case of personnel changes within the district.

- Coordinate district-level RMS issues between district, parent MSC, and USACE RMS Center.

- Ensure development of a specific written plan for RMS deployment within the district.

- Identify, schedule and coordinate all activities related to RMS implementation within the district and provide oversight of these activities.

- Ensure that necessary hardware, software and communication requirements and issues are identified and solved in a timely manner.

- Keep leadership and functional managers involved and informed on all relevant RMS deployment issues.

- Coordinate the training of district RMS data base administrators, RMS systems administrators, and RMS principal trainers, and ensure completion of training in a timely, effective manner.

- Ensure that written instruction, information and standard operating procedures are adopted or developed as necessary to support successful district RMS deployment and operations.

- Monitor and coordinate RMS post-deployment operations, including coordination of problem identification and resolution within the district, to ensure optimum RMS operations/use.

- Monitor, document and report RMS lessons learned within the district, parent MSC and by the USACE RMS Center to all who may need to know.

b. **District RMS Database Administrator**: As a client-server enterprise system, RMS Windows will require the identification and designation of an RMS database administrator. The principal responsibility of the RMS DBA is to oversee the establishment of the RMS database and ORACLE database software on all appropriate servers, and to ensure the continuous operation and maintenance of the RMS database system in support of overall RMS operations.

The main responsibilities of each district **RMS database administrator** are:

- Install and maintain RMS databases and associated ORACLE software
- Provide RMS users access to RMS database by creating user IDs & passwords via UPASS
- Perform RMS system backups and recoveries as required
- Perform RMS database maintenance activities

c. **District RMS System Administrator (SA)**: The initial responsibility of the RMS system administrator is to assist in the implementation of RMS Windows by ensuring that the operating system is functional for RMS users at the various sites within the district. Subsequent to implementation of RMS, the SA provides daily support in order to keep RMS operating effectively and efficiently at all sites.

The main responsibilities of each **RMS SA** are:

- Create users and user ID's on the UNIX operating system via UPASS; or assist district UPASS Coordinator with this activity, if Coordinator has primary responsibility
- Install the RMS operating system on all client computers
- Create file space on the RMS database
- Ensure adequate communication and hardware configurations for local database(s)
- Assist in implementing RMS at district sites, including field offices
- Maintain information and data supporting RMS database operations

d. **District RMS Principal Trainers**: District RMS training will use a "train-the-trainer" approach. Two or more designated individuals from the district at one time will travel to a central location, and will be provided two days of intensive training by the USACE RMS Center staff in the use of RMS Windows. Upon completing this session, the district's principal RMS trainers will organize and conduct RMS training for district office and field office RMS users.

NOTE: Principal Trainers need to be motivated personnel, skilled in construction contract administration. It is to a district's best advantage to designate its high quality individuals. Although preferred, a principal trainer need not be a construction engineer – experienced and communicative construction technicians, contract administrators or even information technology personnel are often well-suited for this position. The principal trainer should have a good knowledge of construction contract management, overall roles and relationships within the district, good communication and human relations skills, CEFMS operations and a working knowledge of information systems and technology as used for USACE construction.

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At larger districts, such as Baltimore, Savannah, Sacramento, Fort Worth, Seattle, Omaha, Louisville, it is recommended that at least three individuals be designated as district RMS principal trainers. At districts such as Walla Walla, Buffalo, Little Rock, Charleston, two principal trainers may be adequate.

The district's RMS principal trainer(s) will work closely with the MSC RMS deployment manager and other members of the RMS deployment team. They will identify all primary and secondary RMS users, identify those to receive RMS training, set up training schedules, coordinate training facilities, equipment, and supplies, and conduct the training for all RMS users within the district. The RMS principal trainer will also coordinate through the district RMS deployment manager with the USACE RMS Center on RMS training activities. This activity will also include feedback and evaluation from students on the RMS user training. The district RMS principal trainer will also make provisions for refresher training when needed, and will train new RMS users.

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Concept for Training

Training for RMS-W will be done in phases corresponding to the planned RMS deployment schedule. It will be provided using the "train-the-trainer" concept. Training of a district's trainers will be done at a centralized location for each deployment phase. The district trainers will then return to their districts and lead the training for the district's RMS users. The training strategy will be revised and refined to incorporate lessons learned as deployment progresses.
Training phases consist of the following components:

a. *RMS and Oracle Installation Training:* At least one month prior to start of deployment for each phase, MSC/District RMS deployment managers will contact the RMS Center to request the documentation for installation of both RMS and the Oracle database. This information will allow the RMS deployment team, including IM staff, to become familiar with these items, and to start configuring computers for installation of RMS. At the start of each deployment phase, RMS Center staff will give a one hour overview training session on installation of required software. The RMS deployment manager, RMS system administrator, and RMS database administrator for each district in the deployment phase are encouraged to attend this initial RMS installation training which will be held at one (or both) of the lead districts for the deployment phase. After this overview training, the RMS team will begin installation of RMS at the lead district. Attendees at this training session are encouraged to observe this installation as part of their orientation.

b. Several one-day *RMS information systems technology training sessions* will be provided by the USACE RMS Center for RMS system administrators and RMS database administrators from each district. These are tentatively scheduled for August, 1999. They will provide a broader background on RMS architecture and its various technical aspects. The sessions will be useful to further train individual SAs and DBAs, who, if possible, may also serve as trainers for others within their district, MSC or throughout USACE.

c. A two-day functional *RMS train-the-trainer session* for RMS Principal Trainers is provided at the beginning of each deployment phase. See the RMS Website for the most current schedule and related information at http://winrms.usace.army.mil . This training is not for the inexperienced. The RMS and CEFMS representative(s) need to be proficient in their respective *contract administration* and *financial management* duties and procedures. It will consist of an orientation on the features of the RMS Windows program and a hands-on exercise of loading a new contract into the RMS-W with downloading/uploading financial data from/to CEFMS. Each participant will be given/directed to various PowerPoint tools that can be helpful to them. These "Trainers" will be expected to return to their respective Divisions/Districts and train other functional users to do similar tasks.

ENCLOSURE 4

d. Starting in January 2000, a three-day in-depth reinforcement training session is planned to be provided at a centralized location as desired by an MSC or district. This reinforcement training will address the additional RMS training needs of our field office representatives, such as Resident/Project Engineers, Office Engineers, Construction Representatives, Inspectors, Clerks, and Procurement Technicians that typically emerge after an initial period of use of a new system. This hands-on RMS reinforcement training is intended to supplement the training individuals received within their own divisions and districts. After deployment when resources are available, and as the need arises, additional on-site training also can be scheduled with the RMS Center.

e. District RMS principal trainers should provide approximately one week on site *RMS user training* for each district's construction staff at a central location within the district.

f. Help desk and remote support will be available for all divisions and districts. Since RMS-W has the simplicity and intuitive characteristics of all Windows-based products, and will closely match the functionality of the RMS-DOS currently being used by a number of districts, user training should be less intensive than for fielding of other large systems.

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Ordering & Distribution Procedures for Oracle Data Base Management Software for RMS Windows

1. **Background**. In contrast to the stand-alone DOS version of RMS, the Windows version is a client/server application. The Oracle relational database management system (RDBMS) will be used in this RMS Windows client/server environment. The HQUSACE Directorate of Information Management established a Corpswide licensing agreement with Control Data Corporation (CDC) for distribution and maintenance (upgrade) of the Oracle database software As part of each deployment phase, districts will identify their specific Oracle database software requirements for RMS Windows. These Oracle software requirements will be reviewed and submitted through the appropriate MSC to HQUSACE as part of the RMS deployment planning. After review and approval, the appropriate Oracle software will be shipped to the district RMS deployment manager for installation in those districts being deployed in that phase. Districts will be responsible for installing, documenting, and maintaining these Oracle client/server software.

2. **Oracle Cost**. The annual maintenance cost and PRIP payback for the capitalized cost of the Oracle client/server license purchase is $270 per *fiscal year per concurrent user*. The HQUSACE Directorate of Information Management will coordinate with CDC, the contractor for the distribution of the required Oracle licenses for each RMS deployment phase, and will handle the billing of annual Oracle license costs for RMS through its CEAP maintenance process. Oracle charges are a full charge per fiscal year or any part of the fiscal year. The contract with the Oracle vendor does not allow for pro-ration of license charges for partial year usage.

3. **Concurrent Users**. Each district annual Oracle license charge will be based on the maximum number of *concurrent users*. The total number of *concurrent users* is the total maximum number of estimated RMS users logged on to RMS *simultaneously* at any given time during a day. If a user is logged on to RMS (Oracle) *simultaneously* with others, regardless of location (e.g., field laptop, PC connected via a LAN at the Resident Office, or a PC at the district connected to the CEAP server), that user is counted as a *concurrent user* for licensing purposes. The total number of Oracle software copies ordered, or the total number of RMS users, or even the total number of servers are not the determining factors for identifying the number of *concurrent* RMS users.

For example, if an office has 15 PCs/laptops that access an RMS database/Oracle server, and five are estimated to be logged on the RMS/Oracle server simultaneously at any given time, this counts as five *concurrent users*, and should be reported as such. That reporting office will then only be charged for 5 rather than 15 *concurrent users* at $270 per *concurrent user*.

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Ordering & Distribution Procedures for Oracle Data Base Management Software (cont'd.)

4. **District Reporting of Concurrent Users.** It is important that the district RMS database administrator determine and report the best estimate of each district's RMS *concurrent users*, based on an analysis of *peak* simultaneous RMS usage on any given work day. The nature of field construction management is that a number of personnel are out on the job site for significant portions of each day, in contrast to district office personnel. Careful analysis will ensure that each field office pays appropriately as is required by the licensing agreement entered into by USACE.

5. **Specific Ordering Instructions for Oracle Software.** Each district, before initiating deployment activities, will identify and report through its MSC information relative to its hardware/software topography and configurations, before distribution of the Oracle database software can be made. Specific instructions detailing the required information and its format will be distributed as part of the deployment instructions for each phase. Aside from the technical information described above, other information required will include specific shipping information, applicable points of contact, the number of *concurrent users*, type of server hardware if applicable, and other information deemed necessary to properly process the order.

6. **Distribution of Oracle Software.** Upon identification and verification of specific Oracle software requirements, the district RMS deployment manager will forward the total district requirements to the HQUSACE RMS Oracle POC (Dody Martelino, CEMP-EC, (202)761-0636, or fax (202)761-4783), using an order form which will be supplied to the district upon request. Upon receipt and review at CEMP-EC, the order will be hand-carried to the CEIM office for actual placement of the order with the supplier. The district deployment manager or a designated person should receive the Oracle software within 5-10 working days after placement of the order with the supplier.

ENCLOSURE 5

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RMS Site License Fee Structure

Organization	Full Year FY 99
MVD	
MVM	$ 12,987
MVN	$ 25,974
MVS	$ 17,316
MVK	$ 17,316
MVR	$ 17,316
MVP	$ 12,987
NWD	
NWK	$ 25,974
NWO	$ 73,593
NWP	$ 8,658
NWS	$ 25,974
NWW	$ 8,658
LRD	
LRH	$ 12,987
LRL	$ 21,645
LRN	$ 21,645
LRP	$ 8,658
LRB	$ 17,316
LRC	$ 17,316
LRE	$ 30,303
NAD	
NAB	$ 77,922
NAN	$ 51,948
NAO	$ 21,645
NAP	$ 21,645
NAE	$ 34,632
NAU	$ 51,948
SAD	
SAC	$ 8,658
SAJ	$ 30,303
SAM	$ 82,251
SAS	$ 69,264
SAW	$ 12,987

ENCLOSURE 6

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RMS Site License Fee Structure

Organization	Full Year FY 99
SPD	
SPL	$ 64,935
SPK	$ 17,316
SPN	$ 8,658
SPA	$ 17,316
SWD	
SWF	$ 43,290
SWG	$ 21,645
SWL	$ 8,658
SWT	$ 21,645
POD	
POF	$ 8,658
POH	$ 17,316
POJ	$ 21,645
POA	$ 8,658
TAC	$ 12,987
HNC	$ 17,316

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RMS Information Systems Technology
(See USACE IM web document on Systems Architecture and "PC Guidance" for latest guidance at
http://www.usace.army.mil/im/ceimp)

1. Specific hardware and software necessary to support RMS Windows at each site depend in
part on the number of *concurrent users*, other applications on the hardware, and existing systems
infrastructure for the site. The open architecture of RMS Windows allows it to work on a variety
of platforms. Recommended platforms are listed below:

    a. **Database Server Software Characteristics**: Oracle 7.3.4 in *Enterprise Server, Workgroup
Server, and Personal editions*. (Note: this software will be centrally provided from HQUSACE
to the *district RMS deployment manager*. See enclosure 5 for information. If testing of Oracle 8
proves satisfactory, then this will be issued.)

    b. **Database Architecture:** The RMS database should be located as high up the USACE
communication architecture as possible, based on district communication capabilities, field
performance testing and user requirements. Enclosure 7a illustrates various district RMS
architectures. Where RMS sites have good connectivity, e.g., T-1, to the CEAP processing
centers at Portland and Vicksburg, RMS databases will be located on the CEAP servers on the
centrally managed UNIX hosts. For those RMS sites without adequate connectivity (i.e.,
satisfactory RMS database performance) either to the district or the CEAP servers, they will have
a *workgroup* installation of Oracle on a local server. This installation of an Oracle database
should be considered a temporary solution dependent on future developments in technology and
communications, and associated costs.
        Databases on local servers within a district will replicate to RMS, CEFMS and PROMIS
databases located at the CEAP centers. We are testing MicroSoft Terminal Server, MetaFrame
and WinFrame with the aim of better supporting sites with less than T-1 connections.

    c. **RMS Application Software Characteristics**: Written in *C++ Builder* using *R&R Report
Writer and Crystal Reports* for the reports, the *Borland Database Engine (DBE)* for middleware
and *Oracle SQL* Net v2* for connectivity.

    d. **RMS Operating System Requirements**: Works on various operating systems including
Windows NT (3.51 and 4.0), *UNIX*, and *Windows 95/98*. RMS also can be made to work with
Novell NetWare 4.1 or newer, but this is a more difficult and problematic arrangement that is not
recommended.

    e. **RMS Database Server Requirements**: (minimum) Pentium 166 Mhz with 64 MB RAM
and 500 MB storage.

<div align="right">ENCLOSURE 7</div>

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RMS Information Systems Technology

f. **RMS Client PC Requirements** (minimum): 80486, 66 Mhz with 16 MB RAM, Windows 95 with 300 MB storage.

g. **Network Communications Requirements** (minimum): Need TCP/IP for all sites with servers and 56 K bps modem for up/downloading and replication to CEAP Processing Center.

h. **Compatibility with Commercial Scheduling Software**: RMS will exchange scheduling information with construction contractors using commercial scheduling software via the USACE Standard Data Exchange Format (SDEF) developed by USACE's Construction-Engineering Research Laboratory (CERL).

i. **Replication**: A replication capability is included with RMS Windows to allow local RMS databases to automatically replicate from site-to-site within the district, and from local sites to the CEAP centers. This will allow scheduling of replication at various times/intervals (e.g., 1-2 times per day), dependent upon management needs.
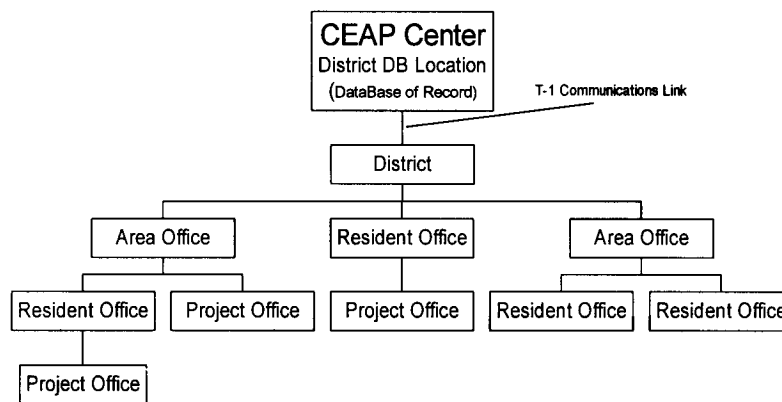
ENCLOSURE 7

RMS ARCHITECTURE

Construction Organization Structure

Typical Arrangements

```
                    ┌──────────────────────┐
                    │ CEAP Center          │
                    │ District DB Location  │
                    │ (DataBase of Record)  │   T-1 Communications Link
                    └──────────┬───────────┘
                    ┌──────────┴───────────┐
                    │       District        │
                    └──────────┬───────────┘
        ┌──────────────────────┼──────────────────────┐
   ┌──────────┐          ┌──────────────┐         ┌──────────┐
   │Area Office│          │Resident Office│         │Area Office│
   └────┬─────┘          └──────┬───────┘         └────┬─────┘
   ┌────┴──────┐                │              ┌────────┴────────┐
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│Resident Office│ │Project Office│ │Project Office│ │Resident Office│ │Resident Office│
└──────┬───────┘ └────────────┘ └────────────┘ └──────────────┘ └──────────────┘
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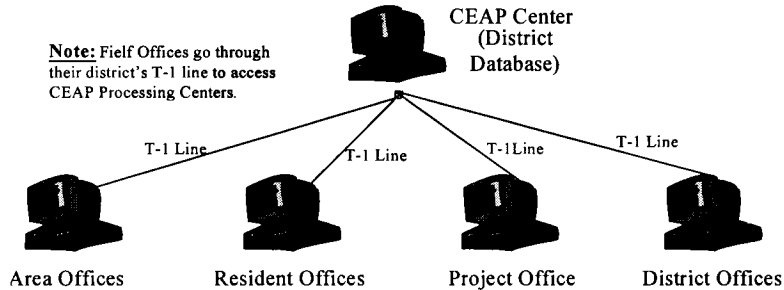
7 Apr 99
1 of 3

ENCLOSURE 7a

CEMP-EC
SUBJECT: Resident Management System (RMS) Draft Deployment Plan

RMS ARCHITECTURE

Ideal/Target RMS Communication Configuration
(All Sites have T-1 or better Communication Lines)

Note: Fielf Offices go through their district's T-1 line to access CEAP Processing Centers.

CEAP Center (District Database)

T-1 Line   T-1 Line   T-1Line   T-1 Line

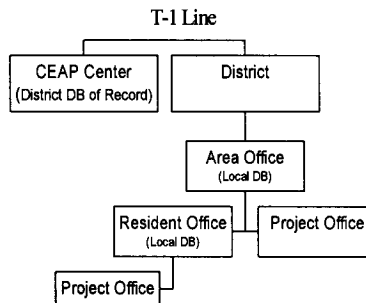Area Offices   Resident Offices   Project Office   District Offices

RMS ARCHITECTURE

Interim RMS Communication Configuration
For Offices with less than T-1 Lines
Communicate with, Update Local & District Databases by Replication

Principles for Database Location

1.Locate the "Master"version of the RMS database at the CEAP Center, to ensure stability and reliability. This is the database of record.

2.Place local RMS database(s) at a level which provides reliable and responsive systems performance. The lower the RMS DB level, the more database administration is required, but system performance improves.

T-1 Line

CEAP Center (District DB of Record) | District

Area Office (Local DB)

Resident Office (Local DB) | Project Office

Project Office

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